Small Business Innovation Research/Small Business Tech Transfer

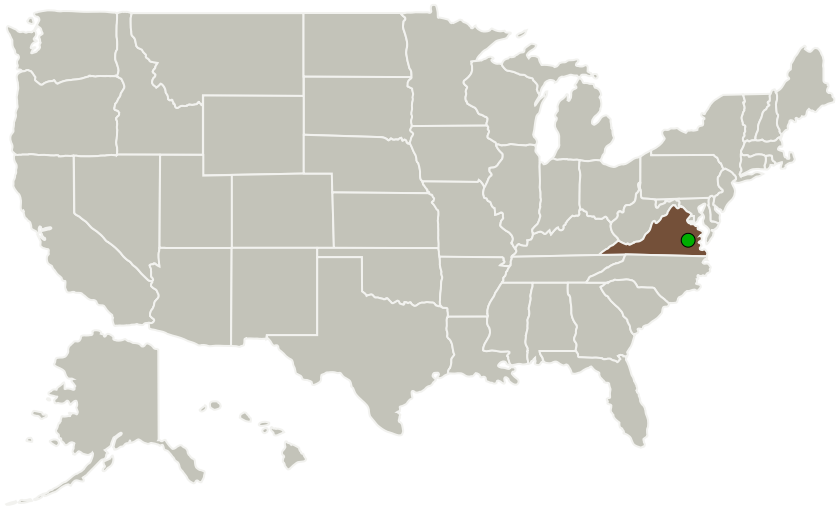
Mission Planner for Dynamic Precision Based Navigation of Unmanned Aircraft Teams, Phase I

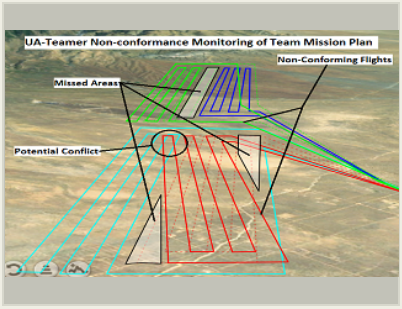
Completed Technology Project (2015 - 2015)

Project Introduction

In this proposed research and development project, we investigate and design an innovative system that solves the key problem of multi-vehicle cooperation and interoperability. Our approach is based upon the principles and techniques of Performance Based Navigation (PBN) and Required Navigation Performance (RNP) concepts and is adjusted for other separation, safety, and weather effects. We design the architecture for a system that simultaneously maintains the efficiency and success of a multi-vehicle mission while also detecting and resolving potential loss of separation and conflicts within the NAS. The challenge is that for a variety of missions, teams of unmanned vehicles can perform the mission efficiently in particular configurations, but simultaneously the team of vehicles must be aware of and accommodate themselves, external traffic, potential intruders, environmental constraints, terrain, and so forth. Our software based system, UA-Teamer, provides the architecture and solutions to achieve mission success and the efficiency promised that multi-vehicle teams can accomplish while maintaining system safety. Our primary technical objectives are: i) Demonstrate a common set of flight path planning parameters built using PBN and other constraints enabling UA to interoperate and cooperate as a team; ii) Produce an algorithmic software approach that selects a best fit flight path set for a UA team mission that involves heterogeneous UAs; and iii) Show that the planners can response to conformance monitoring needs for re-planning and contingencies. The project includes a feasibility demonstration and human factors research into the display of optional trajectory sets for the UA team.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Mosaic ATM, Inc.	Lead Organization	Industry	Leesburg, Virginia
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations
Virginia

Project Transitions

June 2015: Project Start

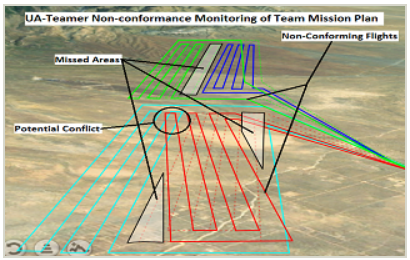
December 2015: Closed out

Closeout Summary: Mission Planner for Dynamic Precision Based Navigation of Unmanned Aircraft Teams, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/139247)*

Images



Briefing Chart Image
Mission Planner for Dynamic Precision Based Navigation of Unmanned Aircraft Teams, Phase I *(https://techport.nasa.gov/image/136981)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Mosaic ATM, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

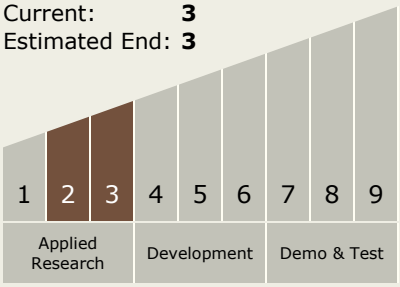
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Brian Capozzi

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.4 Execution and Control

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System